PAN-PACIFIC ENTOMOLOGIST
73(2): 127–134, (1997)

THE NAUCORIDAE (HETEROPTERA) OF SOUTHERN THAILAND

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Abstract.—In January 1995, the southernmost seven provinces of Thailand were surveyed for their naucorid fauna. Eight species representing five genera and four subfamilies were collected from waterfalls, streams, and ponds. An annotated list of taxa and illustrated taxonomic key are presented.

บทคัดย่อ - เดือนมกราคม ๒๕๓๘ ได้ทำการสำรวจมวนดะพาบน้ำ ในพื้นที่ ๗ จังหวัดภาคใต้ตอนล่างของประเทศไทย พบมวนดังกล่าว ๘ ชนิด ซึ่งจัดอยู่ใน ๕ สกุล และ ๔ วงศ์ย่อย โดยเก็บตัวอย่างจากบริเวณน้ำตก ลำธาร และแหล่งน้ำขังอื่นๆ คำอธิบายรายละเอียดของแมลงแต่ละชนิด และรูปวิธาน ได้นำเสนอในที่นี้

Key Words.—Insecta, Naucoridae, Thailand, fauna, aquatic

Tropical peninsular Thailand is topographically diverse with many mountain ranges and associated waterfalls and streams. These numerous aquatic systems as well as vegetated ponds harbor a diverse aquatic insect fauna. The composition of lotic insect communities in southern Thailand is shaped in part by natural biogeographic distributions as well as by disturbances from a variety of natural and anthropogenic origins. Scouring monsoons occur primarily from October through December; however, rainfall occurs throughout the year with an average of approximately 432 cm per year (Nuttonson 1963), and a recorded high of 660 cm (Pendleton 1962). Most streams of peninsular Thailand have their origins in the forested mountains. Although extensive deforestation occurred in the 1970's and 1980's, resulting in the removal of riparian vegetation, the government banned commercial logging in 1989, affording greater protection for these aquatic systems and associated organisms. In addition, use of streams for personal hygiene and for the disposal of acids during the commercial production of rubber contributes to the presence or absence of particular members of the aquatic insect community.

Naucoridae constitutes a family of predacious aquatic Heteroptera which is known to inhabit a wide variety of lotic and lentic situations. This family is most speciose in both the New and Old World tropics, although representatives also occur in temperate regions. Naucorids are considered keystone consumers (Sites & Willig 1991); thus, they constitute an important component of the trophic web of aquatic systems, particularly of tropical streams (Sites in press). Riparian deforestation has been reported to potentially have a substantial effect on populations of Naucoridae by resulting in increased densities (Polhemus & Polhemus 1988, Sites in press).

Although most treatments of Naucoridae are of taxonomic focus, several faunal lists are available for regions of Southeast Asia, including Sri Lanka (Mendis & Fernando 1962), India (Tonapi 1959, and references therein), Indonesia (Nieser

& Chen 1991, 1992), peninsular Malaysia (Fernando & Cheng 1963), the Philippine Islands (Usinger 1937), India, Sri Lanka, and Burma (Distant 1911), and Sumatra, Java, and Bali (Lundblad 1933). No naucorid species are given in the list of insects of southern Thailand (Chinajariyawong et al. 1986). Herein, we present an annotated list of naucorid species collected in southern Thailand and an illustrated taxonomic key.

Field Collections

Thirty collections were made in the southernmost seven provinces of Thailand (Narathiwat, Pattani, Phattalung, Satun, Songkhla, Trang, Yala), including, in some cases, in national parks (with permission). Because of political instability, collecting was not conducted in extreme southeastern Narathiwat Province. This area is mountainous with waterfalls and streams, and holds promise as harboring species not included herein. Collecting was performed with an aquatic D-net. In streams, the substrate was kick-sampled, allowing the current to carry organic debris, including insects, into the net. Along stream margins and in ponds, vegetation was swept with the D-net. All insects were placed into 80% ethyl alcohol.

It is common for more than one species of naucorid (even congeners) to be present in a particular body of water. For some species, both sexes are required for accurate identification. Further, other taxa such as the common lotic genus, *Aphelocheirus*, are polymorphic with respect to wing development. Therefore, when possible, series of specimens should be collected to sufficiently characterize the species and maximize the likelihood of obtaining accurate specific determinations. Voucher specimens have been deposited in the museum of the Department of Pest Management, Faculty of Natural Resources, Prince of Songkla University (PSU), Hat Yai, Thailand; and the Wilbur R. Enns Entomology Museum, University of Missouri, Columbia, Missouri. Although we collected more species than expected from the region based on the literature, the possibility exists that additional species may be found in southern Thailand. Therefore, this key may require modification in the future if additional species are discovered.

Key to the Adults of Naucoridae of Southern Thailand

Identification of species of *Aphelocheirus* requires the distinction between male and female individuals. Males are asymmetrical in the terminal abdominal sterna, whereas females are symmetrical.

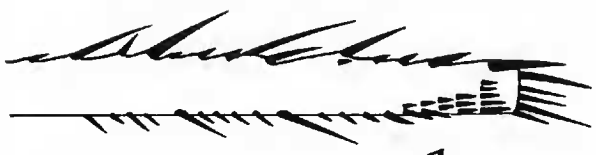
1a Labium reaching posteriorly at most to prothoracic coxae; antennae short, not reaching lateral margins of head 2

1b Labium extending posteriorly to near mesothoracic coxae; antennae long, extending past lateral margins of head 5

2a(1a) Posterior margin of pronotum with lateral ¼ widely separated from anterior margin of mesothorax and hemelytra; ≥ 13 mm in length ..... *Gestroiella limnocoroides* Montandon

2b Posterior margin of pronotum closely appressed to anterior margin of mesothorax and hemelytra; < 13 mm in length 3

3a(2b) Prothoracic leg with pretarsus with single minute claw; protarsus one-segmented ..... *Naucoris scutellaris* Stål



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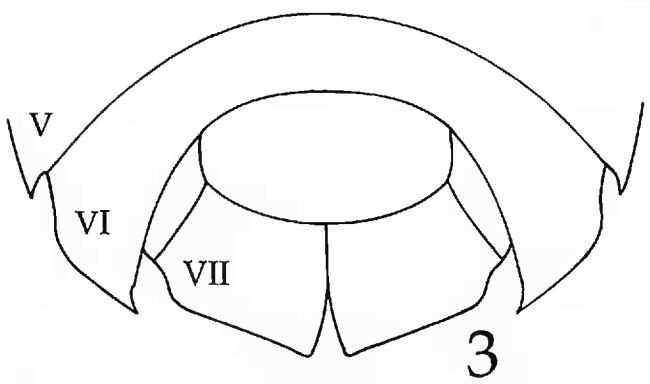

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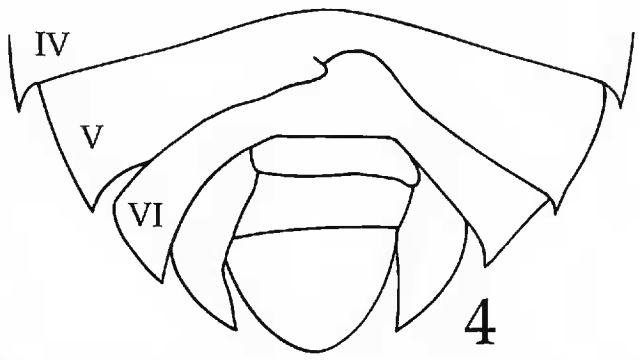

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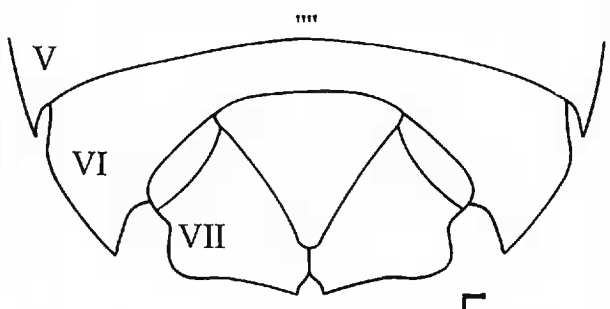

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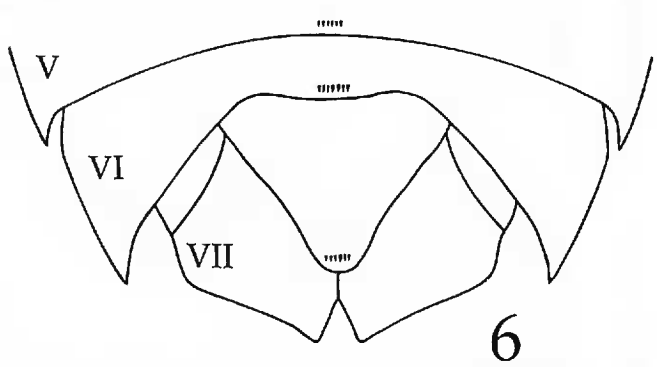

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Figure 1. Distal end of metatibia of *Heleocoris.*
Figure 2. Distal end of metatibia of *Ctenipocoris asiaticus.*
Figure 3. Subgenital plate of female *Aphelocheirus grik.*
Figure 4. Abdominal sternite V of male *Aphelocheirus grik.*
Figure 5. Subgenital plate of female *Aphelocheirus femoratus.*
Figure 6. Subgenital plate of female *Aphelocheirus malayanus.*

3b Prothoracic leg with pretarsus with two conspicuous claws; protarsus two-segmented (one-segmented in *Heleocoris* females) 4

4a(3b) Metatibia ventrally with subapical, stout, parallel spines arranged in two or more rows (Fig. 1); fringe of natatorial hairs on mesal surface of metatibia dense, without gaps between hairs ..... *Heleocoris* spp.

4b Metatibia with circlet of stout, divergent, subapical spines, not arranged in rows (Fig. 2); fringe of hairs on mesal surface with gaps between hairs ..... *Ctenipocoris asiaticus* Montandon

5a(1b) Female with subgenital plate truncate (Fig. 3); male with tab projecting from posterior margin of abdominal sternite V (Fig. 4); never with raised, brown patch on hind trochanter and base of femur .... *Aphelocheirus grik* Polhemus & Polhemus

5b Female with subgenital plate triangular (Figs. 5, 6); male with or without weakly developed tab on abdominal sternite V; if tab is present, then with raised, brown patch on hind trochanter and base of femur 6

6a(5b) Male with hind trochanter and base of femur each bearing well-defined, raised, brown patch; female with posterolateral angle of tergite VII 90° (Fig. 5), subgenital plate without peg-like setae, although hair-like setae present, peg-like setae near posterior margin at midline of sterna IV-V and occasionally VI ..... *Aphelocheirus femoratus* Polhemus & Polhemus

6b Male with hind trochanter and base of femur devoid of well-defined brown patch, although poorly-defined dark streak may occur over much of femur; female with posterolateral angle of tergite VII ca. 130°, 4-6 peg like setae near apex of subgenital plate (may be difficult to see) (Fig. 6), peg-like setae also near posterior margin at midline of sterna IV-VI ..... *Aphelocheirus malayanus* Polhemus & Polhemus

ANNOTATED LIST OF TAXA

SUBFAMILY APHELOCHEIRINAE

GENUS *APHELOCHEIRUS*

Three species of *Aphelocheirus* were collected from southern Thailand. Five additional species have been recorded from northern Thailand (Polhemus & Polhemus 1988) but have not been recorded from the peninsular part of the country. Species in this genus are represented by brachypterous and macropterous forms. The subfamily is represented by only the genus *Aphelocheirus* and is considered by some to represent a distinct family level taxon (Štys & Jansson 1988, and citations therein).

Aphelocheirus femoratus Polhemus & Polhemus

Aphelocheirus femoratus Polhemus & Polhemus 1988: Raffles Bull. Zool. 36: 214–216.

Diagnosis.—The male is distinctive in having well-defined brown patches on the hind trochanters and bases of the hind femora. The seventh abdominal terga of the female have posterolateral angles of 90° and the subgenital plate is triangular. Brachypterous and macropterous forms are consistent in expression of the diagnostic characters.

Discussion.—This species occurs in gravel and rocky substrates of streams. This is the most common *Aphelocheirus* species in southern Thailand, and has been recorded from peninsular Malaysia north to Chiang Mai Province in northern Thailand (Polhemus & Polhemus 1988). This species occurred syntopically with *A. grik* at Banglang National Park and 9 km N Than To, *Heleocoris* sp. nr Srisakhon, and *Gestroiella limnocoroides* at Ton Nga Chang.

Material Examined.—NARATHIWAT: stream 14 km W of Srisakhon, 15 Jan 1995, L-77 (11 brachypterous males, 1 macropterous male, 4 brachypterous females, 7 macropterous females, 46 nymphs); stream below Bacho Waterfall, 15 Jan 1995, L-78 (5 brachypterous males, 4 brachypterous females, 57 nymphs). *SONGKHLA:* stream from Ton Plieuw, 7 Jan 1995, L-62 (17 brachypterous males, 9 brachypterous females, 13 nymphs); same locality, 8 Jan 1995, L-64 (2 brachypterous males, 2 brachypterous females, 2 nymphs); Ton Nga Chang National Park, stream at Buddhist temple, 6 Jan 1995, L-59 (1 macropterous male, 7 nymphs); same locality, 7 Jan 1995, L-60 (14 brachypterous males, 14 brachypterous females, 13 nymphs); same locality, 8 Jan 1995, L-65 (15 brachypterous

males, 10 brachypterous females, 33 nymphs); same locality, 30 Jan 1995, L-81 (13 brachypterous males, 11 brachypterous females, 6 nymphs); Ton Nga Chang National Park, waterfall levels 2 and 3, 6 Jan 1995, L-66 (1 macropterous male, 1 brachypterous female, 1 nymph). *YALA:* Banglang National Park, Than To, 14 Jan 1995, L-73 (7 brachypterous males, 4 brachypterous females); 9 km N of Than To, 15 Jan 1995, L-76 (1 macropterous male).

Aphelocheirus grik Polhemus & Polhemus

Aphelocheirus grik Polhemus & Polhemus 1988: Raffles Bull. Zool. 36: 218–220.

Diagnosis.—The male has a tab extending from the posterior margin of abdominal sternite V and lacks the raised brown patches characteristic of *A. femoratus*. The female is easily recognized by the truncate subgenital plate. Brachypterous and macropterous forms are consistent in expression of these diagnostic characters.

Discussion.—This species occurs in gravel and rocky substrates of streams and has been recorded from peninsular Malaysia north to Chiang Mai Province in northern Thailand (Polhemus & Polhemus 1988). This species occurred syntopically with *A. femoratus* at Banglang National Park and near Than To, and *A. malayanus* near Khao Ka Chong.

Material Examined.—TRANG: ca. 10 km E of Khao Ka Chong National Park on hwy 4, 12 Jan 1995, L-69 (1 macropterous male). *YALA:* Banglang National Park, Than To, 14 Jan 1995, L-73 (1 macropterous male, 1 brachypterous female, 4 macropterous females); 9 km N of Than To, 15 Jan 1995, L-76 (14 brachypterous males, 13 brachypterous females).

Aphelocheirus malayanus Polhemus & Polhemus

Aphelocheirus malayanus Polhemus & Polhemus 1988: Raffles Bull. Zool. 36: 216–218.

Diagnosis.—This species is similar to *A. femoratus* although it is slightly larger. The male lacks the raised brown patches characteristic of *A. femoratus* and the tab on abdominal sternite V characteristic of *A. grik*. The female has a triangular subgenital plate with 4-6 obscure peg-like setae near the apex, and the posterolateral angle of tergum VII is ca. 130°. Brachypterous and macropterous forms are consistent in expression of these diagnostic characters.

Discussion.—This species occurs in the gravel and rocky substrates of streams and previously was known only from peninsular Malaysia. This is the first record of *A. malayanus* from Thailand and it occurred syntopically with *A. grik*.

Material Examined.—TRANG: ca. 10 km E of Khao Ka Chong National Park on hwy 4, 12 Jan 1995, L-69 (4 brachypterous males, 6 brachypterous females, 4 macropterous females, 16 nymphs).

SUBFAMILY CHEIROCHELINAE

GENUS *GESTROIELLA*

Gestroiella limnocoroides Montandon

Gestroiella limnocoroides Montandon 1897: Ann. Mus. Civ. Storia Nat. Genova 17: 371–372.

Diagnosis.—This species is the largest known naucorid in southern Thailand. Length ranges from 13–17 mm, although specimens from other regions of Southeast Asia are considerably larger. The posterior margin of the pronotum is widely separated from the anterior margin of the mesonotum and embolia of the hemel-

ytra. The lateral margins of the head and pronotum are markedly straight and convergent.

Discussion.—This species occurs in the gravel and rocky substrate of streams. We also collected specimens from rock pools of the waterfall which were discontinuous from the main body of water. This record represents the southernmost known extent of the range of *G. limnocoroides* and the nearest known population is at Chiang Mai in northern Thailand. This species occurred syntopically with *A. femoratus* at Ton Nga Chang. The specific status of this population is equivocal because this genus is in need of revision.

Material Examined.—SONGKHLA: Ton Nga Chang National Park, stream at Buddhist temple, 6 Jan 1995, L-59 (9 nymphs, 1 exuviae); same locality, 7 Jan 1995, L-60 (12 nymphs); same locality, 8 Jan 1995, L-65 (1 male, 10 nymphs); same locality, 30 Jan 1995, L-81 (1 male, 26 nymphs); same locality, waterfall levels 2 and 3, 6 Jan 1995, L-66 (1 female, 14 nymphs).

SUBFAMILY LACCOCORINAE

GENUS *CTENIPOCORIS*

Ctenipocoris asiaticus Montandon

Ctenipocoris asiaticus Montandon 1897: Ann. Mus. Civ. Storia Nat. Genova 17: 374–376.

Diagnosis.—In most somatic characters, this genus resembles *Heleocoris,* although it is smaller and the degree of spination of the hind legs is characteristic of *Ctenipocoris*. Specifically, a whorl of spines encircles the distal end of the hind femur, whereas in *Heleocoris* several rows of parallel spines are located ventrally at the distal end. Also, the spines of *Ctenipocoris* are stouter than in *Heleocoris*.

Discussion.—This species is rare, seldom collected in series, and generally occurs in ponds or in vegetation along the quiet margins of streams. The only specimen collected occurred syntopically with *Naucoris scutellaris* in vegetated ponds on the campus at Prince of Songkla University in Hat Yai.

Material Examined.—SONGKHLA: Hat Yai, PSU campus, 5 Jan 1995, vegetated ponds, L-56 (1 male).

Genus *Heleocoris*

Diagnosis.—Members of the subfamily Laccocorinae all have the prothoracic pretarsus with two claws (Usinger 1941). The prothoracic tarsal segmentation is sexually dimorphic in *Heleocoris*: Males have two segments whereas females have only one. In *Ctenipocoris*, both sexes have two segments. Spination of the hind femur will distinguish species in this genus from *Ctenipocoris*. Specifically, two or more rows of parallel spines are located ventrally at the distal end of the hind femur in *Heleocoris*, whereas a whorl of spines encircles the distal end of the hind femur in *Ctenipocoris*. Also, the spines of *Heleocoris* are not as stout as in *Ctenipocoris*.

Discussion.—Two species of *Heleocoris* were collected in southern Thailand. Because of the lack of availability of authoritatively identified comparative material in major collections, these two species are not reliably identifiable. In addition, because of the dire need for taxonomic revision (Nieser & Chen 1992), these species possibly will be removed from *Heleocoris* because the type species of this genus is African, and differences exist between the African and Asian

species (J. T. Polhemus, personal communication). One species (sp. A, which may be *H. ovatus* Montandon) was common when present, occurring in vegetated stream margins and very shallow, slow riffles (< 5 cm depth). Species B was collected on only one occasion and was in a leaf pack in the plunge pool of a small waterfall.

Material Examined.—SPECIES A: *NARATHIWAT:* stream 14 km W of Srisakhon, 15 Jan 1995, L-77 (29 males, 33 females, 5 nymphs); stream below Bacho Waterfall, 15 Jan 1995, L-78 (1 female, 3 nymphs). *YALA:* Banglang National Park, Than To, 14 Jan 1995, L-73 (4 males, 5 females, 2 nymphs); 9 km N of Than To, 15 Jan 1995, L-76 (19 males, 14 females). SPECIES B: *SONGKHLA:* Hat Yai, stream on PSU campus, leaf pack of plunge pool at base of waterfall, 5 Jan 1995, L-57 (1 female, 1 nymph).

SUBFAMILY NAUCORINAE

GENUS *NAUCORIS*

Naucoris scutellaris Stål

Naucoris scutellaris Stål 1860: Kongl. Sv. Freg. Eugenies Jord. 266.

Diagnosis.—This is the smallest of the naucorids in southern Thailand (length, 6.5–7.5 mm). The underside, particularly that of the legs, is conspicuously speckled with dark brown spots. The forelegs have the tarsus one-segmented and pretarsus with one claw. The labium is short, barely reaching the fore coxae.

Discussion.—This species is a common inhabitant of ponds and vegetated stream margins throughout southern Thailand. The known range of this species extends from Java to India (La Rivers 1971) and includes Thailand (Nieser & Chen 1992).

Material Examined.—PHATTALUNG: Khao Chai Son, pond nr hot springs, 12 Jan 1995, L-71 (8 nymphs). *SONGKHLA:* reservoir at end of stream from Ton Plieuw, 7 Jan 1995, L-61 (1 female, 2 nymphs); Hat Yai, PSU campus, vegetated ponds, 4 Jan 1995, L-55 (1 male); same locality, 8 Jan 1995, L-67 (1 male, 1 female, 2 nymphs); same locality, 30 Jan 1995, L-83 (1 male, 2 females, 2 nymphs); Ton Nga Chang National Park, stream at Buddhist temple, 7 Jan 1995, L-60 (1 male). *YALA:* Banglang National Park, Than To, 14 Jan 1995, L-73 (2 males, 6 females); 9 km N of Than To, 15 Jan 1995, L-76 (2 males, 1 female).

ACKNOWLEDGMENT

We are very grateful to Prasert Chitapong and Soontorn Pipithsangchan (Prince of Songkla University) for logistical support in Thailand. We thank Wasant Atisabda for assistance with the Thai abstract, and J. T. Polhemus for assistance with identifications and for reviewing this manuscript. We also thank Michael Nolan, University of Missouri, for providing partial support for this research, including the International Agriculture Programs in the College of Agriculture, Food, and Natural Resources for RWS and the Brown Fellowship for BJN. Partial funding for RWS also was provided by MU project PSSL0232. This is Missouri Agricultural Experiment Station journal series paper 12,425.

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Received 3 Jan 1996; Accepted 26 Sep 1996.